

Amendment and Response

Applicant: Guolin Ma et al.

Serial No.: 10/618,317

Filed: July 11, 2003

Docket No.: 10020800-1/A610.265.101

Title: OPTICAL CONDUIT FOR CHANNELING LIGHT ONTO A SURFACE

**RECEIVED
CENTRAL FAX CENTER****NOV 22 2006****REMARKS**

The following remarks are made in response to the Office Action mailed August 22, 2006. Claims 1, 3-8, 12, and 13 were rejected. With this Response, claim 13 has been amended to correct a typographical error. Claims 1, 3-8, 12, and 13 remain pending in the application and are presented for reconsideration and allowance.

Claim Rejections under 35 U.S.C. § 103

The Examiner rejected claims 1, 3-8, 12, and 13 under 35 U.S.C. § 103(a) as being unpatentable over the Son U.S. Patent No. 6,741,234, in view of the Zimmerman et al. U.S. Patent No. 6,869,206, in view of the Dimmick U.S. Patent No. 5,151,679, and further in view of Butterworth et al. U.S. Patent No. 5,847,507.

The Examiner admits that the Son patent does not disclose an optical conduit having a curved surface as a recited independent claim 1, a curved interior surface as recited in independent claim 8, or an optical conduit having an interior surface as recited in independent claim 13. The Examiner also admits the Son patent does not disclose the limitations of independent claim 1 of the light source embedded at the input end of the body, and a reflector cup embedded at the input end of the body and surrounding the light source, the reflector cup configured to redirect light from the light source towards the output end of the body, and the limitations of independent claims 8 and 13 of a light source embedded within the optical conduit, and a reflector cup embedded within the optical conduit and surrounding the light source.

Furthermore, the Examiner admits that the combination of the Son patent and the Zimmerman et al. patent do not together disclose the limitations of independent claims 8 and 13 of the light source embedded into the optical conduit and a reflector cup embedded around the light source and configured to redirect light towards the output end of the optical conduit.

The Examiner cites the Dimmick patent, which discloses a display sign including light pipes made of light-transmitting material. In the Dimmick patent, the light pipes, such as light pipe 80 illustrated in Figure 3, have two ends having disposed at each end light-emitting diodes embedded within the ends. Each light source is directed towards another end of the light pipe in the direction of extension of the light pipe and a portion of the outer surface of each light pipe is translucent permitting light to exit therefrom. In the Dimmick

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patent, energizing each of the emitted light sources causes light to be transmitted in each light pipe and light from the light pipe emerges through the translucent outer surface of each light pipe for the display of the predetermined message or design.

Therefore, the Dimmick patent teaches away from embedding a light source at the input end of a body having an input end for light input, an output end for light output, and a surface that **totally and internally reflects light from the input end towards the output end** as recited in independent claims 1, 8, and 13. Rather, the Dimmick patent includes light sources at both ends of the light pipe, and light emerges through the translucent outer surface of each light pipe for the display of predetermined messages or designs.

The Examiner specifically recites the Dimmick patent at column 3, line 63-column 4, line 1 for motivation to combine with the Son patent, the Zimmerman et al. patent, and the Butterworth et al. patent. However, at column 3, line 63-column 4, line 1, the Dimmick patent specifically states that light pipes having light-emitting diodes embedded in the ends thereof which illuminate only the letters of the display sign or the pattern of the display and which substantially reduces the maintenance and cost of operation of such exit signs. This language specifically refers to the translucent feature of each light pipe being such that the translucent light pipes permit light to exit therefrom and emerging light through the translucent outer surface of each light pipe provides the display of the predetermined message or design.

Thus, the Dimmick display sign would not work with an optical conduit according to claim 1 having a body with an input end for light input, an output end for light output, and a curved surface that totally and internally reflects light from the input end towards the output end.

In addition, as discussed above and as acknowledged by the Examiner, the Dimmick patent discloses a light pipe which by design allows light to emerge through the translucent outer surface of each light pipe for display of the predetermined message or design. Accordingly, the Examiner agrees that the Dimmick light pipe design would not work in an optical mouse which needs an optical conduit to transmit light from an input end and to an output end as recited in independent claims 8 and 13. Moreover, as recited in independent claims 8 and 13, the optical conduit provides an interior surface that totally and internally

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reflects light from the input end towards the output end which is the opposite effect than which is achieved with a light pipe.

In addition, the Examiner admits that the combination of the Son patent, the Zimmerman et al. patent, and the Dimmick patent do not disclose the limitations of independent claim 1 of a reflector cup embedded at the input end of the body and surrounding the light source, the reflector cup configured to redirect light from the light source towards the output end of the body or the limitations of independent claims 8 and 13 of a reflector cup embedded within the input end of an optical conduit and surrounding the light source, the reflector cup configured to redirect light from the light source toward the output end of the optical conduit.

The Examiner cites the Butterworth et al. patent which discloses a light emitting diode that is attached and wire bonded into a reflector cup lead frame. The Examiner specifically cites the Butterworth patent at column 2, line 7-16 which states that the apparatus described in the Butterworth et al. patent produces efficient light emitting diodes over a broad portion of the visible spectrum via a lens containing a fluorescent dye over molded to a short wavelength light emitting die placed within a reflector cup. However, the Butterworth et al. patent does not teach or suggest or provide motivation to have a light source embedded at the input end of an optical conduit made from optically transmissive material, and having a surface that totally internally reflects light from the input end towards the output end, and a reflector cup embedded at the input end and surrounding the light source, the reflector cup configured to redirect light from the light source towards the output end as recited in independent claims 1, 8, and 13.

In addition, as to independent claims 8 and 13, the Butterworth et al. patent does not teach, suggest, or provide motivation to provide the above limitations in an optical conduit which is included in an optical mouse.

In response to the Examiner's Response to Applicant's Arguments, the Examiner admits that the Dimmick patent is directed to a light pipe that would be unsuitable for use within an optical mouse due to the light transmission from the sides of the light pipe. The Examiner states that the inclusion of the Dimmick patent reference is not intended to provide a light pipe to the system, but to show that the insertion of a light source within a light pipe is known to provide improved efficiency of transmitting light from the light source to the light

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pipe. Nonetheless, the Examiner specifically states that "by inserting an LED such as one described by Butterworth into the optical conduit as discussed by Dimmick this would result in the optical conduit having a light source and reflector cup embedded within the optical conduit." This Dimmick optical conduit referred to by the Examiner is the light pipe and placing a reflector cup in the light pipe would not work with the Dimmick light pipe, because the light pipe is specifically designed to allow light to emerge through the translucent outer surface of each light pipe for display of the predetermined message or design. Moreover, as acknowledged by the Examiner, the Dimmick optical conduit (i.e., light pipe) is unsuitable for use in an optical mouse as claimed in independent claims 8 and 13 and accordingly unsuitable for an optical conduit according to claim 1 having a body with an input end for light input, an output end for light output, and a curved surface that totally and internally reflects light from the input end towards the output end.

Therefore, the combination of the Son patent, the Zimmerman et al. patent, the Dimmick patent, and the Butterworth et al. patent do not teach or suggest, alone or in combination, independent claims 1, 8, and 13. Furthermore, dependent claims 3-7 further define patentably distinct independent claim 1, and dependent claim 12 further defines patentably distinct independent claim 8. Therefore, dependent claims 3-7 and 12 are also believed to be allowable.

Therefore, Applicants respectfully request reconsideration and withdrawal of the 35 U.S.C. § 103 rejection to claims 1, 3-8, 12 and 13, and request allowance of these claims.

CONCLUSION

In view of the above, Applicant respectfully submits that pending claims 1, 3-8, 12, and 13 are in form for allowance and are not taught or suggested by the cited references. Therefore, reconsideration and withdrawal of the rejections and allowance of claims 1, 3-8, 12, and 13 is respectfully requested.

No fees are required under 37 C.F.R. 1.16(h)(i). However, if such fees are required, the Patent Office is hereby authorized to charge Deposit Account No. 50-3718.

The Examiner is invited to contact the Applicant's representative at the below-listed telephone numbers to facilitate prosecution of this application.

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Respectfully submitted,

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CERTIFICATE UNDER 37 C.F.R. 1.8: The undersigned hereby certifies that this paper or papers, as described herein, are being facsimile transmitted to the United States Patent and Trademark Office, Fax No. (571) 273-8300 on this 22nd day of November, 2006.

By 
Name: Patrick G. Billig